

## Syllabus JRF (AEA and AEB) 2026

Soil biota, Soil microbial ecology, Types of soil organisms, Symbiotic and non-symbiotic nitrogen fixation, Mycorrhizae, Elemental transformation and cycling: carbon, nitrogen, phosphorous, potassium and sulphur, Bioremediation, Soil enzymes, Microbial indicator of soil quality, Biofertilizers, Soil organic matter; Essential elements in plant nutrition, Manures and fertilizers, Soil fertility and fertiliser use, Soil, plant, water and atmosphere relationships, Soil and water pollution and remediation, Problem soils and remediation, Soil chemistry, Soil pedology, Soils of India, Instrumentation.

Cell structure, origin and types (Prokaryotic and eukaryotic cell; gram +ve and -ve cells), Bacterial growth curve and kinetics, Cell organelles, Bacterial genome, plasmid, Chromosomes, Flagella (ultrastructure), Endospore

Nucleic Acids, its types and structure, Central Dogma, Genetic code, Recombinant DNA technology, Cell cycle, Cell Division and its regulation, DNA repair, RNA synthesis and processing, Protein synthesis and processing

Proteins – structure and classification of amino acids; primary, secondary, tertiary and quaternary structure of proteins; Carbohydrates - structure of mono-, di- and polysaccharide; stereoisomers, enantiomers and epimers; Lipids - structure of simple lipid and compound lipid, fatty acids, Metabolism of carbohydrates, proteins and lipids. Protein, lipid and carbohydrate metabolism.

Enzymes- classification, nomenclature, types and kinetics, Phosphorylation: ATP Synthesis, Oxidative and photophosphorylation mechanism and differences.

Photosynthesis and respiration, Plant hormones, Photobiology, Secondary metabolites and synthesis, Stress physiology, Plant defence.

Fundamentals of Environmental Sciences, Environmental Chemistry, Environmental (Air, Soil and Water) Pollution and Control, Environmental Microbiology, Statistical Approaches and Modelling in Environmental Sciences, Climate change, Biogeochemistry, Greenhouse gases and aerosols; Waste management, Environmental legislation and impact assessment

**Basic Statistics:** Measures of central tendency and dispersion; Sampling methods; Probability distribution, Design of experiments; Correlation and regression analysis; Tests of significance; Analysis of variance; Probit analysis.